

The present invention directed to a method and apparatus to perform low-density parity-check code encoding of user data \mathbf{u} of length N_u , by inserting parity data \mathbf{p} of length N_p into output data \mathbf{c} of length N in accordance with a parity matrix \mathbf{H} such that $\mathbf{H} \bullet \mathbf{c} = 0$, comprising the steps of: (a) receiving the user data of block length N_u ; (b) decomposing $\mathbf{H} \bullet \mathbf{c}$ into a first component $\mathbf{H}_u \bullet \mathbf{u}$ corresponding to the user data and a second component $\mathbf{H}_p \bullet \mathbf{p}$ corresponding to the parity data such that $\mathbf{H}_u \bullet \mathbf{u} + \mathbf{H}_p \bullet \mathbf{p} = 0$; (c) calculating a vector $\underline{\mathbf{u}} = \mathbf{H}_u \bullet \mathbf{u}$; and (d) calculating $\mathbf{p} = \mathbf{H}_u^{-1} \bullet \underline{\mathbf{u}}$.